

# *Peak Performance for Silverthorne Elementary*

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## *Summit Public Schools*

made high performance design a top priority for Silverthorne Elementary School from the beginning.

"We set out to build a school that would last 100 years," said **Superintendent Wes Smith**. "As a superintendent for fifteen years, I've spent too much of my energy and too many taxpayer dollars to fix or replace schools that are only 30 years old. We can't afford to do that. The **fiscally responsible** thing for us to do is to build a school that people not only *can* use, but even *more so*, will *want* to use for at least 100 years."

"To make a building work for that long, we have to do it right. It has to be efficient and durable, and it has to be flexible to adapt to changing needs over time. It also has to have a good feel to it so people will see it as a positive expression of their community and will want to continue using it."

## *Does it cost more?*

The construction budget for the school is \$9 million, or about \$145 per square foot. Considering that

**"We're building a school that will save us about 40% on utility bills, will last 100 years, and it fits into a typical school construction budget."**

- *Wes Smith, Superintendent*

mountain communities like Silverthorne usually have to pay about \$25 per square foot more than their counterparts on the front range, the school's budget is in the typical range for other Colorado schools.

## *Two-story design*

Silverthorne Elementary School is designed to serve 430 students in the mountain town of Silverthorne, 70 miles west of Denver. The 62,500 square foot school is scheduled to open fall 2004.

A two-story design was chosen. This design has several advantages over a single story design. It minimizes the building footprint, thus minimizes environmental disturbance. It frees up open space on the site. And it improves the effectiveness of natural ventilation.

## *Daylighting*

"Our design team's goal is that **no electrical lighting will be needed in the classrooms, on most sunny or overcast days.**" said Mike Arnold, Director of Operations and Maintenance. In addition to ample windows in each classroom, daylight from skylights is directed to each classroom to illuminate the back wall for classrooms on both floors of the school.

To ensure that the daylighting would operate properly, a scale model was built and analyzed by a daylighting lab. Based on the results of the analysis, the team included a movable 3-foot interior light shelf. The design will allow teachers to cut out glare at any time of the year.

## *Natural Ventilation*

"The design provides operable windows for each classroom, which earns us high marks with teachers," said Mike Arnold. "On warm days, outdoor air can enter through the windows. Our two-story design creates a stack effect that will help move the warming air upward to the atria, where its vented by exhaust fans.

# A High Performance Design Success Story

## PROJECT DETAILS

**Facility:** Summit Public Schools, Silverthorne Elementary

**Facility Type:** Public elementary, grades K-5

**Facility Size:** 430 student capacity, 62,500 square feet total

**Facility Location:** Town of Silverthorne, 70 miles west of Denver, school elevation 9,100 feet

**Schedule:** Design 2002, ground-breaking Spring 2003, open Fall 2004

**Procurement:** RFQ specified sustainable design as a high priority and requested a design team that could include sustainable design features within the existing budget

**Project Budget:** \$9.3 million or \$148 per square foot (within range of typical construction for schools in Summit County).

**Energy and Water Cost Savings:** \$27,300 per year projected, compared to code-compliant design

### Energy Efficient Features:

- Daylighting with 2-story light shafts
- High performance low-e glazing
- Increased insulation levels
- Natural ventilation
- CO2 monitors
- Variable air volume (VAV) air handling

**"One of the most important things we can do is to create a motivating, inspiring place where teachers and students thrive."**

- Eric Miller, architect

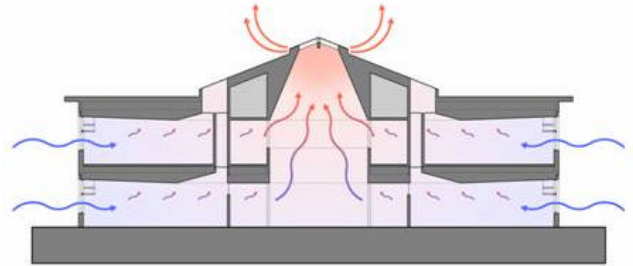
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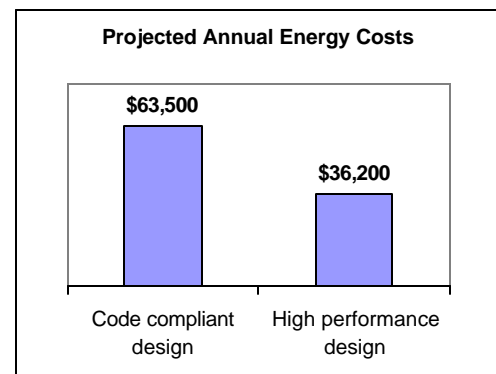


*Natural ventilation was designed in from the beginning. Fresh air enters via operable windows, and as it warms rises and is vented out the exhaust fans at the top of the atria.*

When one or more windows are closed, efficient mechanical ventilation will be used. Variable air volume air handlers deliver fresh air to the rooms, regulated by CO2 monitors. This design keeps air handler noise away from the classrooms, improving the acoustics in the instructional areas.

### Energy efficiency

At an elevation of 9,100 feet, energy efficiency was a key factor in the design. By optimizing the building orientation, using daylighting to the fullest, increasing insulation levels, and by using natural ventilation, the team developed a design that will save the district \$27,000 per year in money that would otherwise be spent on high utility bills.



*The high performance design saves an estimated \$27,300 annually, based on analysis provided by Rebuild Colorado.*

The Rebuild Colorado program of the Governor's Office of Energy Management and Conservation provided design assistance and DOE-2 energy modeling for the project. "Having the detailed analysis helped us choose the right places to spend the budget. We were able to make informed decisions," said Kelly Yamasaki, principal architect with Oz Architects. "For example, we weren't sure if the variable air volume system was cost-effective compared to a constant volume system. The energy modeling showed that it was indeed worthwhile."